



Interviews

**Our future is digital.**

# Making the Smart Mill a reality.

## Interview with Philipp Marquart.

Philipp Marquart grew up close to the headquarters of Grüninger Mühlen, in Flums, in the uplands of St. Gallen (Switzerland). Philipp Marquart completed his apprenticeship as a miller at the Grüninger family business before undertaking further training at the Swiss Milling School in St. Gallen, followed by attendance at the Master School in Stuttgart (Germany) where he won the “Best International Young Miller” award. In November 2017, Philipp Marquart became Production Manager at Grüninger Mühlen at the age of 20. In addition, he has been an expert examiner at the Swiss Milling School (SMS) in St. Gallen since 2018 and an expert examiner for the milling profession, specializing in food (Swiss Certificate of Competence) since 2019.

**Philipp Marquart, at 23, you are currently the youngest production manager in the Swiss milling industry. May I ask, do you have sufficient experience for the role?**

Philipp Marquart: (laughs) Yes, actually I do. I've been working for six years already in the milling industry and so I already have quite a bit of experience. I have gained important knowledge that I know how to use. Also, I think that in a developing industry, too much routine could be a hindrance.

**Especially when it comes to breaking new ground?**

Yes, exactly. Here, too, I follow my principle: In order to achieve the possible, the impossible must be tried again and again. I'm open to innovation and want to learn about, and try out, new technologies. It's important that I don't have tunnel vision – I want to look out for what else is happening.

**What innovations and new products have you come across at the Grüninger mill?**

Philipp Marquart: Quite a variety, depending on the area: where automation and monitoring are concerned, there's a lot happening. Thanks to Bühler's automation, the Grüninger mills have been running in single-shift operation for ten years already – eight hours actively operated, 16 hours run on automatic. This means there is a quality check around the clock. If any deviations are detected, the system alerts the miller on duty. On the whole, what I found when I joined the company has given me a good starting point for further innovations.

**What innovations have you introduced since then?**

We have further expanded and modernized our automated quality inspection for flour using NIR technology so that, in future, quality-conscious production can continue to be guaranteed around the clock. We were also the first mill in the world to introduce Bühler's Mercury MES Manufacturing Execution System. It enables us to monitor every process and coordinate incoming and outgoing goods, thus ensuring complete traceability. Then, as a pilot partner of Bühler, we equipped five of our 17 grinding and milling passages with new roll sensors. We hope that this will provide us with information about temperature and vibration, and about power consumption related to the entire grinding process. The next step is to work out the implications from this data. Among other things, we would like to compare the two factors, machine wear and yield, and find out at what point a higher yield is more costly than a lower one. Wear and energy consumption are indicators that can be altogether higher and we therefore have to take them into account.

**Surely modern IT systems can handle large amounts of data?**

Sure, but if you monitor every process with sensors, it generates almost unimaginable quantities of data. The lists are endless. They far exceed the analysis capabilities of humans. That means it's got to be done by computer. However, that requires special algorithms, which have to be developed if we don't know them yet. These algorithms work better the more varied the data is that they receive. And that takes us to Bühler Insights. It collects the data from different systems anonymously and analyzes it in clusters.



### **Philipp Maquart**

At 23, Philipp Maquart is the youngest Production Manager of a Swiss mill.



#### **What conclusions have you already reached?**

It's still a bit too early for that. However, we have already come to some initial conclusions about temperature and vibration dependency. We're working with the people from Bühler to assess our experiences and we meet with them regularly.

#### **What "digital" projects are you working on next?**

We're currently looking into how to link our laboratory to production. Up to now, the laboratory has been completely separate from the mill. By linking it to production, we would save an entire work step. To put it simply, in future, the Mercury MES control system will automatically find the correct parameters for the correct grinding process based on the laboratory values.

#### **You are committed to digitizing Grüninger mills.**

##### **What do you see as the advantages of this?**

The more we digitally link and control our individual processes, the more we can simplify standard processes. That will also reduce the number of potential sources of error. The bottom line is that all of this leads to consistent quality and yield, savings in energy consumption and, ultimately, optimized working conditions.

#### **Grüninger Mühlen, is a relatively small player by international comparison. Is digitizing the mill worth the financial expense?**

Yes, in fact it's extremely worthwhile. We must not only compare ourselves with other countries, but also prove ourselves on the Swiss market. That means that we work here under "Swiss" conditions with high personnel costs, a very high level of quality and with end consumers who demand a high level of transparency. Digitization helps us to meet these requirements.

#### **What other possibilities do you see for further digitization at Grüninger Mühlen?**

Our company doesn't just do production. Individual divisions are still working with different systems. We need to bring all the processes together from intake, the whole production, quality assurance, warehousing up to delivery into smart systems that work with each other and are compatible with the Mercury MES control system. This will simplify our work and lead to continuous improvements.

#### **Will you be able to turn Grüninger Mühlen into a smart mill by 2030?**

In a family business like ours, it's the management that basically decides on the future. From my point of view, we are working towards a smart, autonomous mill. In production, staff will be able to concentrate on monitoring processes and ensuring compliance with standards.

#### **What role do humans play in the "smart mill"?**

We mustn't forget that we work with natural products. Not everything can be standardized. We still need our employees' knowledge and skills. It is they — not the (digital) machine — that have a feel for the subtleties and nuances, and they are the ones that set the standards.

# Making the Smart Mill a reality.

## Interview with Urs Dübendorfer.

Modern flour mills are highly complex systems. Each individual system component, whether it is involved in the arrival of raw materials or in the cleaning, grinding, storage or bagging of the finished product, is a highly sophisticated piece of machinery that works with utmost precision and accuracy. The only scope left for improvement is in the finer details. To optimize further, we need to look at the potential of linking the individual system components together and in the possibilities offered by autonomy. Bühler is working flat out on developing the building blocks for what we call the “Smart Mill”. Grain Milling Technologist, Urs Dübendorfer, who has been with Bühler AG for 28 years and is a member of the Smart Mill Development Team, explains how much progress Bühler has already made in this area.

### **Urs Dübendorfer, how would you describe a Smart Mill?**

In a Smart Mill many of the process steps are monitored by sensors. Data from the different parts of the system is collected centrally and analyzed using special algorithms. The most important feature of a Smart Mill is that if deviations from the specifications are detected, the system automatically makes corrections and adapts individual process steps. The Smart Mill is becoming more automated and autonomous — comparable with self-driving cars.

### **That sounds simple. How far along are you and your team in developing the Smart Mill?**

We’ve already achieved a great deal in the years that we’ve been working on the Smart Mill. But we’re aware that we still have a long way to go. We’re currently in the phase of being amazed by all the possibilities. At the same time, we’re preparing a solid structure to build on with our Bühler Insights platform. We’re the only supplier in our area to be ISO 27001-certified (see box).

### **But many highly-automated mills already exist. There’s already a wealth of experience in that area. The amazement can’t be that great, can it?**

It’s true that many mills around the world already have automated solutions. However, they are all only partial solutions, the majority of which are standalone. The individual processes have not yet been linked together and work in isolation, and there’s little regulation. The more we look into the issue of centralized autonomy, the more we see how complex the task is. We have already developed various digital solutions. But what’s still missing is the consolidation of all the processes into a “think and command center”.

### **And what are the main challenges?**

Large amounts of data, and integrating or linking internal and external data, among other things.

### **Surely modern IT systems can handle large amounts of data?**

Sure, but if you monitor every process with sensors, it generates almost unimaginable quantities of data. The lists are endless. They far exceed the analysis capabilities of humans. That means it’s got to be done by computer. However, that requires special algorithms, which have to be developed if we don’t know them yet. These algorithms work better the more varied the data is that they receive. And that takes us to Bühler Insights. It collects the data from different systems anonymously and analyzes it in clusters.

### **What do you mean by integrating external data?**

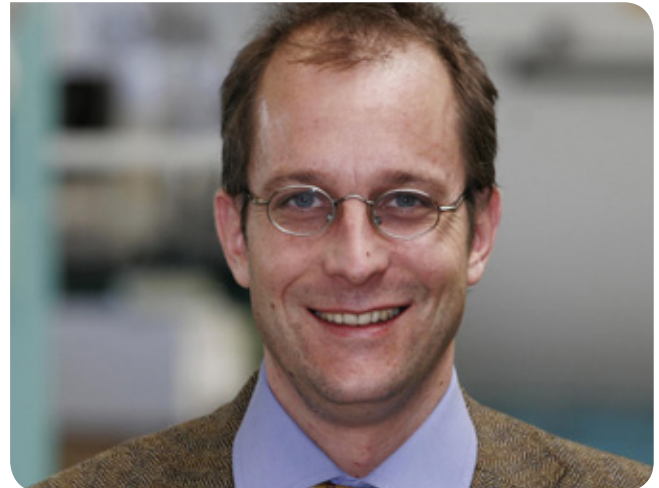
An autonomously operating mill should not only react to detected errors or deviations, it should also be able to be proactive. That means its “brain” should be able to anticipate the mill’s operating condition based on external data such as the weather or the quality of the raw materials... and activate appropriate measures such as service and maintenance work.

### **Isn’t that a bit much to ask?**

No. We know so much about the various processes involved in the production of flour — from harvesting right through to bagging. If we succeed in linking all these processes together, that will be a big step towards fulfilling the wishes of millers and a big step toward creating the Smart Mill.

**Urs Dübendorfer**

Member of the Smart Mill Development Team  
at Bühler's Milling Solutions business unit



**What do millers want then?**

When I talk to leading millers, they all want three things: consistent quality, lower costs and complete traceability. That requires smart systems — they support the most consistent product quality possible, they help to use energy and other resources sparingly, they enable the recording of every process and, in doing so, they also enable complete traceability.

**And the Smart Mill will be able to fulfill these wishes?**

Yes, because a Smart Mill always works “intelligently” and supports the miller wherever recurring processes are involved. However, even the smartest mill cannot replace entrepreneurial thinking or feeling for the market that any successful miller needs.

**Why should a miller engage with digitization at all?**

What's important is understanding that digitization offers the miller in-depth information that has not been available until now. The collection of data in real time also enables you to predict trends and drifts, which gives you the advantage of intervening earlier in the process. For the miller, this means more robust process control and greater support for consistent end product quality.

**How will digitization change the work of a miller in the coming years? Will it become an office job?**

No, in fact, just the opposite. All the data and information are collected by online sensors and each sensor has to be calibrated. That is, and will remain, a skilled job for process experts. Data availability is being improved enormously; you will always have the data with you on your mobile device. That means the miller will be even more likely to be in the milling plant. To put it

another way, the plant will remain, but the control room will disappear. The amount of office work will be drastically reduced because reports and such like can become “automated”.

**Does that make the job of a miller more attractive?**

Yes, definitely. The milling profession will become even more interesting because it will be even more varied and multifaceted. In addition to milling technology, mechanics, electrics and automation, we are now also adding digital technology. The expertise required profession will be more diverse, and the miller's profession will become even more attractive for specialists from other sectors.

**ISO 27001-certified**

The certification confirms that Bühler has implemented and operates an ISMS (Information Security Management System) that meets the requirements of ISO/IEC 27001:2013. In short, an ISMS is a framework of policies and processes for identifying and addressing information security risks by applying a set of information security best practices (measures and safeguards) and through the continuous improvement of information security maturity.

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